BLOCKCHAIN IMPLEMENTATION TRENDS IN DIGITAL ARCHIVES: BIBLIOMETRIC ANALYSIS

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ABSTRACT

The increasing development of digital archives requires an optimal solution to face challenges in its security aspects. These challenges can be overcome by using block-chain as an encryption that keeps the archive reliable and trustworthy. This study aims to determine the development of scientific article publications that identify the relationship between blockchain and archives. Data was obtained from the database published by Web of Science (WoS) from 2015-2023. The keywords used to obtain appropriate results are "Blockchain" and "Archive" based on topics. Then 106 documents were obtained, namely articles and proceedings papers. The search results were exported in BibTex format and analyzed bibliometrically using the biblioshiny web interface from R Studio software. The results of the analysis show that blockchain-related publications in digital archives are still not very developed. This is because publications have only started since 2015, which is the beginning of innovation in the application of blockchain in digital archives. In addition, it is supported by treemap and wordcloud analysis which did not find the word archive.

1. INTRODUCTION

Archive storage in digital form is one alternative solution to manual record management practices. The inevitable impact of the modernization process in the digital era is the emergence of information in electronic form, or digitalization trends (Fitri 2020). This digitalization trend provides easy access and makes archives more awake. Archive security can also be offered with blockchain technology. Blockchain technology systems can store data decentralized throughout the network so that existing data cannot be changed by one party without the consent of the other party (Suryawijaya 2023). One example of the use of blockchain technology is in cryptocurrency, with 5,048 types of blockchain cryptocurrencies and 212,909 users spread throughout the world (Hermawan and Maukar 2021). Basically, a blockchain is a database of records of all transactions or digital information storage events that have been executed and shared among participating parties. In a blockchain system, transactions that occur need to be verified by the majority of users, so they cannot be deleted except by removing the entire system from scratch. Blockchain also has features that can be accessed directly by users without having to worry about the security of their data, because in the blockchain system, there is transparency in all processes carried out (Dimas 2023). Thus, blockchain technology can be implemented in various areas of life, especially in digital archives.

Digital archives are one of the innovations in the field of archives that are widely applied in the current era because digital archives are considered to be able to better protect material from an archive. Digitization of an archive is a process by which documents or images will be available electronically to reduce wear and tear and extend the life of an archive or document. Archives in digital form are also more suitable for use because of their use in the current era, which demands speed of sharing, ease of access, and flexibility in networking. Of the many advantages of using digital archives, there is no need for the possibility of the risks that follow, such as those in terms of security. The data security of an individual or organization is very important

to be protected so that data or documents do not have loopholes in attempts at theft or misuse (Maulani et al. 2023). Another risk that can occur if you do not pay attention to security in digitization is the occurrence of manipulation and falsification of a document.

Forgery of digital archives can occur if digital archives containing data and files are stored on servers without encryption. Encryption is considered important in the storage of a server because encryption will protect the contents of archives from unauthorized access and will ensure that only authorities can read the contents of documents (HS 2023). If an archive containing data and files can be accessed by unauthorized users, it is prone to fraud by irresponsible parties by replacing legitimate files with fake files or modifying original data (Permatasari et al. 2020). This will cause the authenticity of the archive to be questioned, resulting in a decrease in user trust. An archive, especially in a digital archive, should have an instrument of trust so that the archive remains authentic or maintained authenticity (Dimas 2023). Instrument of trust in digital archives refers to the technology and procedures used to ensure the accuracy of a digital archive. The instrument of trust makes it possible to produce digital archives that are trustworthy and reliable by more than one party. Instrument of trust is applied with the security and confidentiality of data that can be maintained on a digital archive. The security that exists in a digital archive will be able to show that the management system used from the archive is good and trustworthy.

In the aspect of protecting the security of a digital archive, the application of blockchain technology to archives is one of the innovations that can be applied. This happens because blockchain technology can protect a document with decentralized data. Topics related to blockchain in archives are still poorly discussed in the scientific world, so this has become a driver for researchers to analyze blockchain topics in archives. This study aims to determine the development of publications related to blockchain implementation in archives based on Web of Science (WoS) databases, which are then analyzed using bibliometrics. A bibliometric analysis of the literature provides a broader and more systematic picture of the research landscape

on blockchain in pan-grounding practices. Bibliometric analysis develops publication data analysis techniques that begin by identifying the authors, articles, and references used. Bibliometric analysis will produce two different aspects, namely bibliometric maps and graphic representations of these maps through computer programs (Marlina 2021). Bibliometrics can also analyze the number of citations from scientific articles used (Aria and Cuccurullo 2017). It is hoped that this research can contribute to the advancement of science, serve as a basis for future research, and increase knowledge of the importance of authentication in digital archives.

2. LITERATURE REVIEW

2.1. Blockchain

Blockchain is a database that is distributed and shared on every node (system) connected to a computer network (Aqsa 2022). As a database, blockchain will store information electronically in a digital format by combining peer-to-peer networks, smart contracts, and consensus mechanisms as additional components besides cryptography (Utomo 2021). According to Noor (2020) blockchain can offer advantages in the aspect of security with the three main components of blockchain are block, chain, and network. The function of a block in blockchain is to collect information in a group, then store it in it. Each block has a certain storage capacity. After being filled with information, the block will be closed and connected with other blocks to form a data chain called blockchain. The results of Bralić et al. (2020) research on maintaining certificate security as an archive shows that the use of blockchain is able to create a timestamping scheme that contains the hash of the previous timestamp so that it forms a chain of information that can increase trust in the archive. When storing a chain of certificates in a distributed blockchain, it allows validation of records whose certificates have expired. It is also supported by Lemieux (2016) research that shows the potential of using blockchain to create and maintain trustworthy digital records by considering several limitations and risks, such as issues related to desirability, noise, and authenticity of records, as well as challenges in terms of long-term digital preservation.

2.2. Digital Archives

Digital archives are data (archives) that can be stored and transmitted in a discontinuous form, or in the form of binary codes whose use requires the help of computational tools to be able to read or process data that has been made in binary form (Fitri 2020). The results of Tella et al. (2022) research show that the use of tools to manage digital archives needs to pay attention to human resource factors and technical complexity to increase archival accountability, in addition to the high costs required for implementation. Digital archives refer to information or materials stored and organized in electronic format for long-term preservation and access. Digital archives will enable efficient and fast storage, search and retrieval of information. According to research conducted by Putra and Merliana (2021), it shows that digital archives can facilitate information management, ensure the accessibility of up-to-date information, and improve the quality of educational institutions in supporting the learning process. This is also supported by research by Putri and Azwar (2022) and Şentürk (2014) that digital archives allow the sharing and distributing of information to users in different locations, increasing the effectiveness of high reliability and information retrieval in digital archive systems.

2.3. Bibliometric

Web of Science is one of the databases used in bibliometric studies, also known as Web of Knowledge. WoS is an online platform that contains a bibliographic information database and information analysis resources that enable the evaluation and analysis of research performance (Moreno-Guerrero et al. 2020). WoS provides access to various data documents, ranging from academic journal articles and reviews to conference proceedings papers. Since 1990, Web of Science has had a fairly broad range of scientific disciplines, with most journals published in English (Chadegani et al. 2013). The Web of Science acts as a primary data source for conducting bibliometric analysis and network mapping in research that will be carried out on blockchain and archive topics. WoS is used to collect publication

data, including articles, conferences, and other sources related to the topic to be researched (Wang 2023). Data obtained from Web of Science will be analyzed to identify trends, collaborations among authors, organizations, and countries, as well as to map thematic evolution and keywords related to research topics, namely blockchain and archives. Many studies have been carried out using the Web of Science database source; for example, Kaffash et al. (2021) have investigated big data algorithms and applications in intelligent transportation systems from the WoS database from 1997 to 2019. The research carried out was analyzed using bibliometric methods, including relevant sources, authors, and highly cited works; analysis of keywords and concepts of science; conceptualization; and intellectual and social order.

2.4. Biblioshiny

Biblioshiny is the web interface of the "bibliometrix" package in R Studio software (Ranjbari et al. 2022). Biblioshiny, in the form of a web interface, functions as a study tool that bibliometrics uses to analyze publications in depth (Patil 2020). Biblioshiny is one of the functions of the R-Studio application, which is a GUI (Graphical User Interface) that is useful for facilitating data analysis with bibliometric analysis (Aria and Cuccurullo 2017). R-Studio was used to categorize and evaluate contributions from authors, countries, institutions, and journals (Alviz-Meza et al. 2022). The results of the analysis using bibliometrics will be a dataset consisting of main information, scientific production, authors, and documents, as well as three-field plots (Santosa and Yuadi 2023). Biblioshiny is used as a tool to process and analyze data extracted from the Web of Science (WoS) related to research on predetermined topics, namely blockchain and archives. This tool helps in identifying research trends and collaboration patterns among authors, organizations, and countries, as well as in visualizing keyword dynamics and thematic evolution in the blockchain and archive fields from 2015 to 2023 (Wang 2023).

2.5. Web of Science (WoS)

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3. METHOD

This research uses bibliometric analysis methods on publications related to the application of blockchain in archives, then visualized with Biblioshiny in a bibliometric package from R Studio software. Theibliometric analysis method can study research patterns, relationships between authors, collaboration networks, to the influence of a study on certain disciplines. Bibliometric analysis is often used because it can find networks between publications and other publications through keywords, authors, author

institutions, authors' places of origin, and the like through visualization of maps and graphs from the help of certain software. The advantage of bibliometric analysis is that it can objectively evaluate all articles that have been published on a particular subject, thus eliminating potential selection bias (Paltrinieri et al. 2019).

Figure 1. Flowchart Analysis of Bibliometric Methods

Figure 1 shows a flowchart of the method used in this study. Starting from exporting from the database to the process of analyzing on the Bibioshiny web interface. At the initial stage, the data obtained is exported in BibTex format and the file is stored in the form of (.bib). Data in BibTex format will be analyzed using the bibliometrics package in R Studio software. Then entering the commands >library(bibliometrix) and >biblioshiny() will bring up the Biblioshiny web interface. In this biblioshiny, the data that has been obtained was managed and visualized to be analyzed using bibliometric methods.
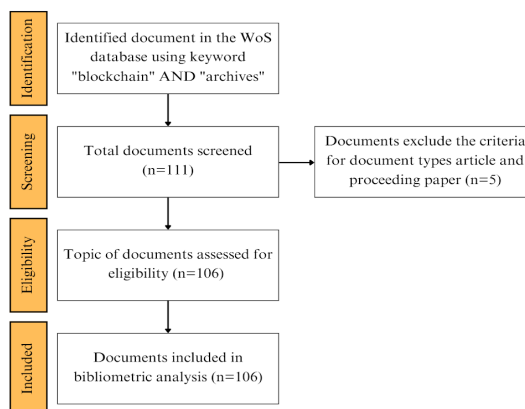
Figure 2. Flowchart of Data Retrieval Process in Web of Science

In this study using 2 keywords, namely "blockchain" and "archive" as displayed in the flowchart Figure 2. Figure 2 explains that data related to blockchain implementation in archives is obtained from a collection of publications indexed byWoS. Retrieval of data from WoS using keywords that have been set with 2 AND boolean rows, then search for the appropriate document using the topic search field to search for keywords in the title, abstract, author keywords, plus se keywords until a search string is obtained TS=(blockchain) AND TS=(archives) so that 111 documents were obtained. In order to obtain the appropriate bibliometric analysis results, researchers conducted a screening process limiting data collection to article document types or proceeding papers, then obtained 106 final documents for analysis. The resulting search string is (TS=("blockchain") AND TS=(archives)) AND (DT==("ARTICLE" OR "PROCEEDINGS PAPER")). Researchers analyze the development of blockchain implementation in archives using the Biblioshiny web interface with 3 analysis matrices, namely based on sources, authors, documents equipped with three knowledge structures including conceptual structure, intellectual structure and social structure.

The bibliometric analysis will involve searching the source matrix to identify the journals that are most relevant to the topic, covering annual scientific productions and the most relevant sources. The author matrix will evaluate how many researchers are involved in the topic, focusing on the most relevant authors. Meanwhile, the document matrix will illustrate the number of publications and keywords related to the topic, including the scientific production of relevant countries, as well as visualizations such as concept maps and wordcloud. Beside that, intellectual structure analyzes the relationship between one writer and another. This is based on a network of quotations from authors who have published documents on the topic under study. The closer the relationship between one author and another, the more often the author's quotations are used in publications related to blockchain topics and archives published by other authors. For social structure, further analysis is related to network collaboration between authors and also the country map of the collaborating authors. Network collaboration is shown

by the existence of a chain of relationships between one author and another. The larger the network between these authors, it will indicate that these authors write more about blockchain research topics and archives than other smaller networks of other authors. Meanwhile, the collaborative map of countries that contribute to blockchain topics and archives explains more about countries that frequently collaborate with other countries on the same topics. This analysis contributes to a systematic understanding of academic articles related to blockchain in digital archives.

4. RESULTS AND DISCUSSION

4.1. Main Information

The development of blockchain in archives from WoS scientific publications is described in detail in the main information section in Table 1. The main information is about data, document content, authors, author collaboration, to document types. The main information in the 2015–2023 period related to blockchain in the archives resulted in 106 documents from 97 journal sources with publication growth of 0%. The average document is 2.37 years old with citations per year per document reaching 7,132 times. In addition, there are references to blockchain topics in the archive of 3,027. There are also 2 author categories and 3 collaboration author categories. This data comes from two types of documents, namely articles include articles; data papers, articles; Early access and MWoe to the proceedings.

Table 1. Main Information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2015:2023
Sources (Journal, Books, etc)	97
Documents	106
Annual Growth Rate %	0
Document Average Age	2.37

Description	Results
Average citations per doc	7.132
References	3027
DOCUMENT CONTENS	
Keywords Plus (ID)	69
Author's Keywords (DE)	404
AUTHORS	
Authors	327
Authors of single-authored docs	12
AUTHORS COLLABORATION	
Single-authored docs	12
Co-Authors per Doc	3.49
International co-authorships %	27.36
DOCUMENT TYPES	
article	59
article; data paper	1
article; early access	3
proceedings paper	43

Source: Web Interface Biblioshiny

4.2. Annual Scientific Production

Figure 3 shows patterns related to annual scientific production from bibliometric analysis of documents on blockchain topics and archives. Research began to be taken in 2015, where publications related to blockchain and archives still occupy a low position, which is about 1 document, and in 2016 there were no publications about blockchain and archives. But from 2017 to 2018, blockchain-related publications and archives began to increase to around 13 documents. In the following year, from 2019 to 2022, blockchain-related publications and archives continued to experience a significant increase with the most documents around 40. However, in 2023, the publication of documents related to blockchain and archive topics will

see a drastic decline. From 40 documents in 2022, it dropped to only 15 documents in 2023.
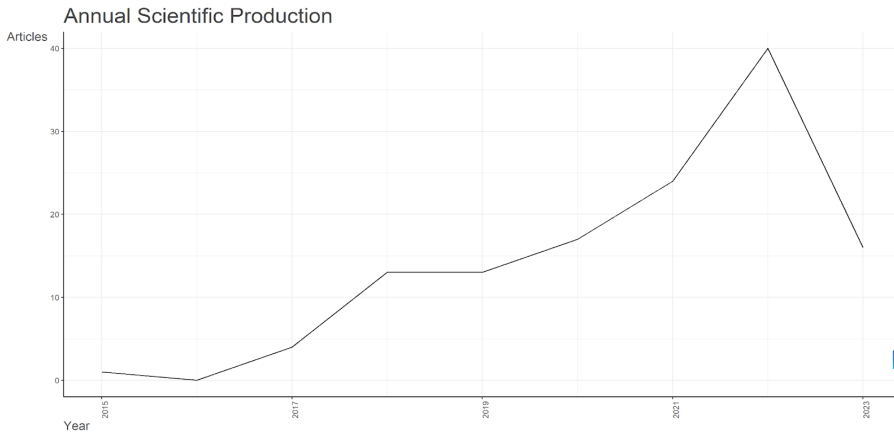
Figure 3. Annual Scientific Production
Source: Web Interface Biblioshiny

4.3. Most Relevant Sources

Figure 4 shows the most relevant publication sources on blockchain and archive topics. In the first position, sequentially the journal Computers and the journal Security and Communication Networks contributed the most publications related to the theme of blockchain and archives, which were about 3 articles each. In second place, sequentially starting from the journal 2022 IEEE International Conference on Blockchain (Blockchain 2022), 2022 IEEE International Conference on Electrical Engineering, Big Data and Algorithms (EEBDA), Applied Sciences-Basel, Electronics, and IEEE Access, from the five journals each contributed 2 publication articles related to blockchain and archive topics. And in the third position that contributed 1 publication article related to blockchain and archive topics, it was sequentially occupied by three publication journals, namely the 2015 IEEE 4TH Global Conference on Consumer Electronics (GCCE), followed by the 2017 IEEE 16th International Symposium on Network Computing

and Applications (NCA). In fourth position, occupied by the journal 2017 IEEE 6TH International Conference on AI &; Mobile Service (AIMS) by contributing 1 document related to Blockchain topics on the archive.
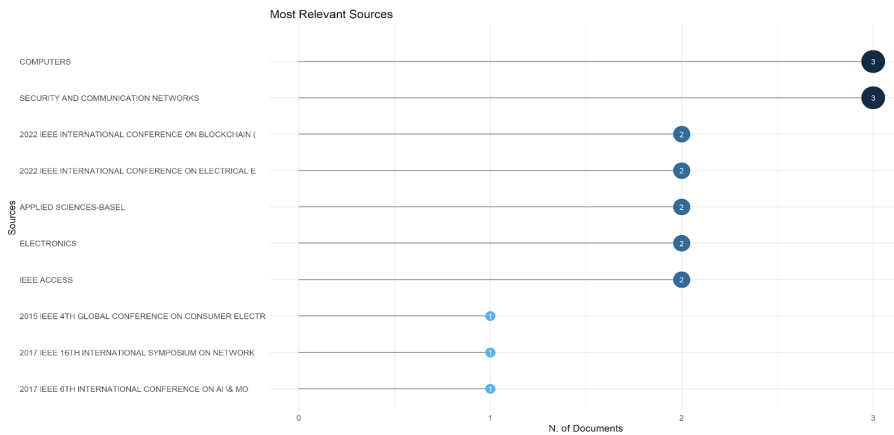
Figure 4. Most Relevant Source
Source: Web Interface Biblioshiny

4.4. Most Relevant Authors

Figure 5 shows the authors who are most relevant to blockchain topics in archives. In the first position sequentially occupied by Bui T, Higgin J, Thearux O, Wang Y with each author producing 4 documents related to the topic. In second place, sequentially occupied by Bell M, Collomosse J, Sheridan J, Wang H, Wang Z who each produced 3 published documents. And in third place is occupied by Banno R who only produced 2 documents.
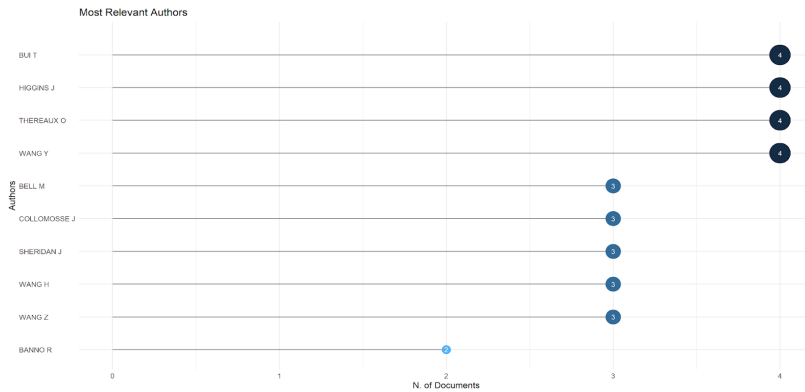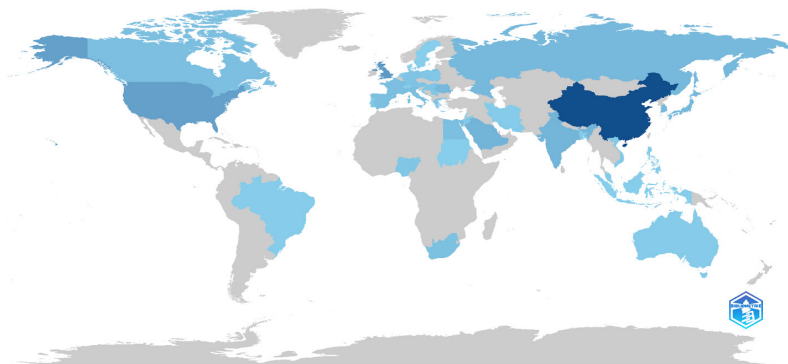
Figure 5. Most Relevant Source
Source: Web Interface Biblioshiny

4.5. Scientific Production of Country

As many as 20 countries contributed to the production of scientific publications related to online impulse buying. In Figure 6, it is known that the darker the blue, the more documents published related to blockchain in the archive. It is known that China is the main country that publishes the most documents in the darkest blue color followed by the USA and UK. While other countries contributed to publications but not as many as 3 countries.

Figure 6. Most Relevant Source
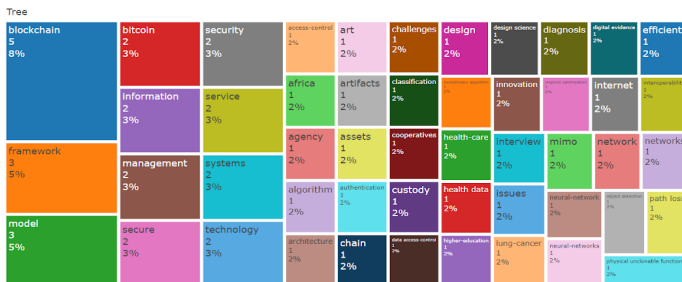Source: Web Interface Biblioshiny

Based on figure 7, there are two types of collaboration from the country of publication authors, namely Single Country Publication (SCP) and Multiple Country Publication (MCP). In figure 7 which displays the top ten of the document publishing countries on the topic of Blockchain and Archive, China occupies the first position as the country that contributes the most publications, which is around 23 articles, of which 18 are articles published in SCP and 5 other articles are published in collaboration with other countries or MCP. In the second position of the country contributing the most article publication is occupied by the USA which publishes about 10 articles, consisting of 7 compiled by SCP and 3 others compiled by MCP. In third and fourth place related to the country of publishing the most articles, occupied by the United Kingdom and Korea which respectively published as many as 7 and 5 articles. In fifth position occupied by several publishing countries such as India, Italy, Japan, and Russia with each publishing articles related to Blockchain and Archive topics as many as 4 articles. Then in sixth position, where each country contributed 3 articles occupied by Canada, France, Greece, Romania and Saudi Arabia. And for the seventh position occupied by seven countries where each country contributes 2 publication articles, these countries are Austria, Croatia, Germany, Hungary, Nigeria, Portugal, and South Africa.
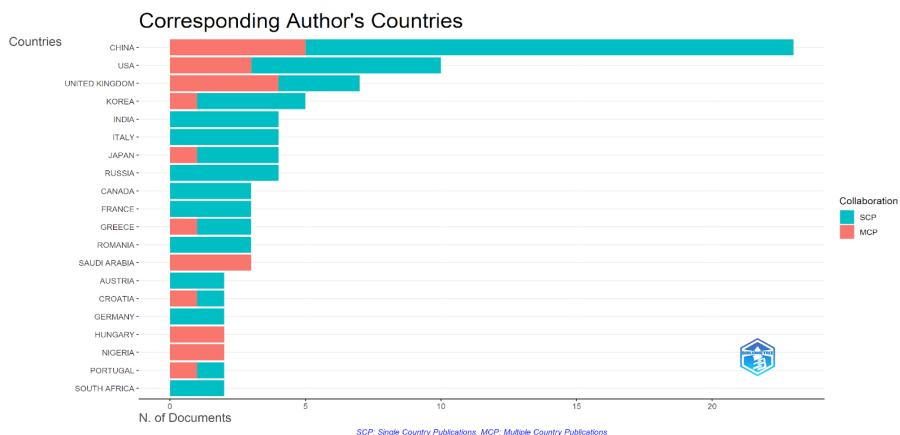

Figure 7. Corresponding Author's Countries
Source: Web Interface Biblioshiny

4.6. The Most Frequently Occurring Word Frequency

The most popped-up word about blockchain on the archive can be analyzed using treemap and wordcloud. Figure 8 is a word treemap analysis of 50 major blockchain-related and archive keywords. Keyword analysis with treemap provides a clear reflection of the condition of the topic because it is accompanied by the number of occurrences of words and their frequency. Gamba r 8 shows the model word with the highest proportion of 8% of blockchain words appearing 5 times, followed by framework 3 times with a proportion of 5%, model words 3 times with a proportion of 5%. In addition, the words secure in the pink column and gray security show a direct correlation to the cause of implementing blockchain in digital archives. While Figure 9 is a wordcloud visualization, the higher the word frequency, the larger the word. The most dominant word is"blockchain", as explained in Figure 8.

**Figure 8. Tree Map**
Source: Web Interface Biblioshiny
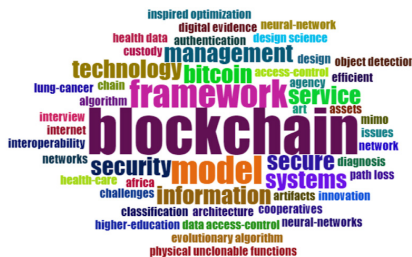
Figure 9. Wordcloud
Source: Web Interface Biblioshiny

4.7. Intellectual Structure

The intellectual analysis of the structure in this study takes the citation network of authors who have published blockchain topics and archives on the web of science indexing systems as data to be analyzed. In figure 10 there are 9 plots from large to small, consisting of nine colors. In green, it consists of 6 author quotes, namely Wood G. 2014, Nakamoto S. 2008, Benet J, Liang XP. 2017, Back A. 2014, and Corallo M. For purple and brown, both consist of 4 author quotes. In blue, it has 3 author citations and in orange it has 2 author quote names. The five colors are connected to each other, while the other four colors stand alone without being related to other colors. The four colors start from red which has 3 author quotes, then followed by pink, tosca and gray which each have 2 author name citations. If the author's quotes have a relationship like the previous 5 colors, where if the relationship is getting closer, then the author's quotes are often used in publications related to blockchain and archive topics.
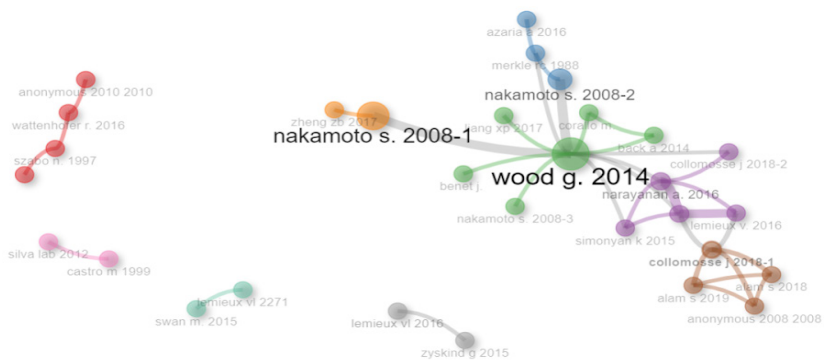

Figure 10. Co-citation Network
Source: Web Interface Biblioshiny

4.8. Social Structure

The collaboration of author networks and country maps could shed light on the social structure of blockchain publications on digital archives. Figure 11 describes several authors who have network collaborations

with other authors. The larger the name Orcircle of the author, the author dominates the research carried out collaboratively. Network collaboration is also shown by the chain of relationships between authors with each other. The pink color in Figure 11 shows Bui T often doing collaborative research with Thereaux O and Higgens J. In addition, there is also collaboration between authors shown with eleven different color clusters. The eleven color clusters do not often collaborate on writing blockchain-related research and archives so the model shown is simple.
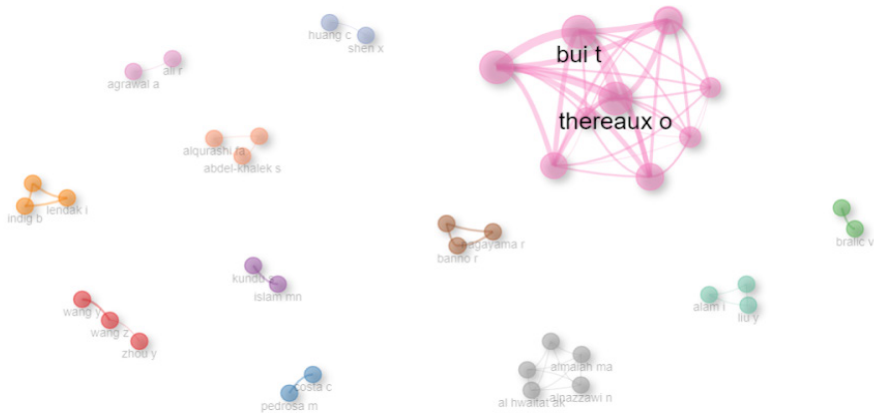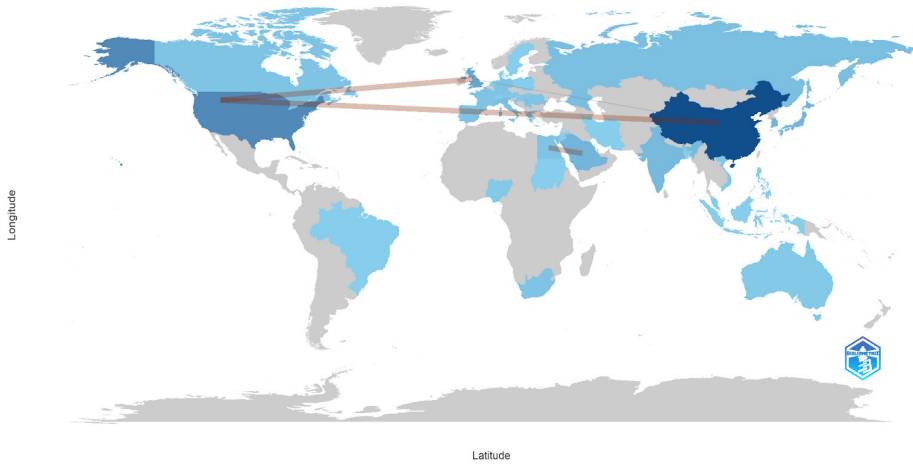

Figure 11. Collaboration Network
Source: Web Interface Biblioshiny

Figure 12 shows a collaborative map of contributing countries on the topic of blockchain and archives. In Gambar 12, writing collaborations are often carried out by China, USA, and UK. This is supported by the many research documents issued by these countries. In table 2, we find ten countries that have the highest frequency of writing collaboration. It can be seen that the Chinese state dominates collaboration with other countries from various parts of the world. With the highest frequency of collaborating with the UK as many as 2 so it can be concluded that China is a country with a social structure that often collaborates with other countries.

Country Collaboration Map

Figure 12. Country Collaboration Word Map
Source: Web Interface Biblioshiny

Table 2. Collaboration Network

From	To	Frequency
CHINA	BANGLADESH	1
CHINA	GREECE	1
CHINA	INDIA	1
CHINA	IRAN	1
CHINA	JAPAN	1
CHINA	KOREA	1
CHINA	MALAYSIA	1
CHINA	PHILIPPINES	1
CHINA	SAUDI ARABIA	1
CHINA	UNITED KINGDOM	2

Source: Web Interface Biblioshiny

5. CONCLUSION

The year 2015 was the beginning of innovation in the application of blockchain in digital archives. Blockchain-related publications on digital archives increased dramatically in 2022 with the number of publications of 40 documents, with China as the country that has the most publicized fish related to the topic. In addition to China, the USA and the United Kingdom are countries that contribute to publishing documents related to blockchain topics on digital archives. The journal Security and Communication Networks and author Tu Bui is one of the sources and one of the authors who have published the most blockchain-related documents on digital archives. In addition, based on collaboration network images, the author of Tu Bui also often collaborates with three other most relevant writers, namely Higgins J and Thereaux O.

Based on the results of the analysis that has been done, the blockchain on the archive is still not very developed. This is because the publication has only been started since 2015 which is the beginning of research innovation on the application of blockchain in digital archives. In addition, in treemap and wordcloud images, the word archive is not found, but instead the word "security" is still found which is still related to the application of blockchain in digital archives. This research aims to find out the development and trend of scientific article publications that identify the relationship between blockchain and archives. This relationship between blockchain and archives is important for making security-related innovations in digital archives. As in other studies, the study still has some limitations because it only uses the Web of Science as the main database. Suggestions for future research researchers may consider using the Scopus database or a merger of the two to get more accurate results.

BIBLIOGRAPHY

Alviz-Meza, Anibal, Manuel H. Vásquez-Coronado, Jorge G. Delgado-Caramutti, and Daniel J. Blanco-Victorio. 2022. "Bibliometric Analysis of Fourth Industrial Revolution Applied to Heritage Studies Based on

Web of Science and Scopus Databases from 2016 to 2021." *Heritage Science*. Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1186/s40494-022-00821-3.

Aqsha, Muhammad. 2022. "Implementasi Sistem Blockchain Terhadap Penatausahaan Barang Milik Negara Berupa Tanah Di Indonesia." *PKNstan*.

Aria, Massimo, and Corrado Cuccurullo. 2017. "Bibliometrix: An R-Tool for Comprehensive Science Mapping Analysis." *Journal of Informetrics* 11 (4): 959–75. https://doi.org/10.1016/j.joi.2017.08.007.

Bralić, Vladimir, Hrvoje Stančić, and Mats Stengård. 2020. "A Blockchain Approach to Digital Archiving: Digital Signature Certification Chain Preservation." *Records Management Journal* 30 (3): 345–62. https://doi.org/10.1108/RMJ-08-2019-0043.

Chadegani, Arezoo Aghaei, Hadi Salehi, Melor M. Md Yunus, Hadi Farhadi, Masood Fooladi, Maryam Farhadi, and Nader Ale Ebrahim. 2013. "A Comparison between Two Main Academic Literature Collections: Web of Science and Scopus Databases." *Asian Social Science* 9 (5): 18–26. https://doi.org/10.5539/ass.v9n5p18.

Dimas, Muhamad. 2023. "Trend Penerapan Blockchain Dalam Meningkatkan Keamanan Informasi Digital."

Fitri, Muhammad. 2020. "Transformasi Arsip dalam Menghadapi Era Digital." https://doi.org/10.13140/RG.2.2.21744.07687.

Hermawan, Febrian Reza, and Maukar. 2021. "Implementasi Teknologi Blockchain pada Equity Crowdfunding." *Journal of Information System, Applied, Management, Accounting and Research* 5 (1): 249–60. http://journal.stmikjayakarta.ac.id/index.php/jisamar,.

HS, Marby Ira. 2023. "Dampak Digitalisasi dan Digitalisasi Arsip terhadap Pelayanan Publik di Stasiun Meterologi Kelas 1 Radin Inten II Lampung." *JSL Jurnal Socia Logica* 3 (1): 1–10.

Kaffash, S., Nguyen, A.T. and Zhu, J. 2021. "Big Data Algorithms and Applications in Intelligent Transportation System: A Review and

Bibliometric Analysis". *International Journal of Production Economics*. https://doi.org/10.1016/j.ijpe.2020.107868

Lemieux, Victoria Louise. 2016. "Trusting Records: Is Blockchain Technology the Answer?" *Records Management Journal* 26 (2): 110–39. https://doi.org/10.1108/RMJ-12-2015-0042.

Marlina, Lina. 2021. "Twenty Years of Islamic Banking in Indonesia: A Biblioshiny Application." https://digitalcommons.unl.edu/libphilprac.

Maulani, Isma Elan, Tedi Herdianto, Dwi Febri Syawaludin, and Medika Oga Laksana. 2023. "Penerapan Teknologi Blockchain pada Sistem Keamanan Informasi." *Jurnal Sosial Dan Teknologi (SOSTECH)* 3 (2): 99–102.

Moreno-Guerrero, Antonio José, Gerardo Gómez-García, Jesús López-Belmonte, and Carmen Rodríguez-Jiménez. 2020. "Internet Addiction in the Web of Science Database: A Review of the Literature with Scientific Mapping." *International Journal of Environmental Research and Public Health*. MDPI AG. https://doi.org/10.3390/ijerph17082753.

Noor, Muhammad Usman. 2020. "Implementasi Blockchain Di Dunia Kearsipan: Peluang, Tantangan, Solusi Atau Masalah Baru?" *Khizanah Al-Hikmah : Jurnal Ilmu Perpustakaan, Informasi, Dan Kearsipan* 8 (1): 81. https://doi.org/10.24252/kah.v8i1a9.

Paltrinieri, Andrea, Mohammad Kabir Hassan, Salman Bahoo, and Ashraf Khan. 2019. "A Bibliometric Review of Sukuk Literature." *International Review of Economics and Finance* 86 (July): 897–918. https://doi.org/10.1016/j.iref.2019.04.004.

Patil, S B. 2020. "Global Library & Information Science Research Seen through Prism of Biblioshiny." *ResearchGate* 40 (49): 157–70. https://www.researchgate.net/publication/339973834.

Permatasari, Intan, Meryam Essaid, Hyeonwoo Kim, and Hongtaek Ju. 2020. "Blockchain Implementation to Verify Archives Integrity on Cilegon E-Archive." *Applied Sciences (Switzerland)* 10 (7). https://doi.org/10.3390/app10072621.

Putra, I Wayan Murjana, and Ni Putu Eka Merliana. 2021. "Peran Arsip Digital Dalam Mendukung Proses Pembelajaran," 141–52. https://prosiding.iahntp.ac.id.

Putri, Nilam Ananda, and Muhammad Azwar. 2022. "Evaluation of the Utilization of Electronic Filing System as Information Retrieval Medium at the Records Centre Unit of the Ministry of Environment and Forestry, Indonesia." https://digitalcommons.unl.edu/libphilprac.

Ranjbari, Meisam, Zahra Shams Esfandabadi, Tetiana Shevchenko, Simone Domenico Scagnelli, Su Shiung Lam, Sunita Varjani, Mortaza Aghbashlo, Junting Pan, and Meisam Tabatabaei. 2022. "An Inclusive Trend Study of Techno-Economic Analysis of Biofuel Supply Chains." *Chemosphere* 309 (December). https://doi.org/10.1016/j.chemosphere.2022.136755.

Royani, Yupi, and Dukariana Idhani. 2018. "Analisis Bibliometrik Jurnal Marine Research in Indonesia." *Media Pustakawan* 25 (4): 63–72.

Santosa, Kezia Rahmawati, and Imam Yuadi. 2023. "Analisis Bibliometrik Pajak Minuman Berpemanis Dalam Kemasan (MBDK)." *Jurnal Ilmiah Ilmu Administrasi*. Vol. 6. http://ojs.stiami.ac.id.

Şentürk, Burçak. 2014. "Effective Digitization in Archives." *Journal of Balkan Libraries Union* 2 (1): 11. https://doi.org/10.16918/bluj.78275.

Suryawijaya, Tito Ira Eka. 2023. "Memperkuat Keamanan Data Melalui Teknologi Blockchain: Mengeksplorasi Implementasi Sukses Dalam Transformasi Digital Di Indonesia." *Jurnal Studi Kebijakan Publik* 2 (1): 55–67. https://doi.org/10.21787/jskp.2.2023.55-67.

Tella, Adeyinka, Halimah Odunayo Amuda, and Yusuf Ayodeji Ajani. 2022. "Relevance of Blockchain Technology and the Management of Libraries and Archives in the 4IR." *Digital Library Perspectives*. https://doi.org/10.1108/DLP-08-2021-0065.

Utomo, Teguh Prasetyo. 2021. "Implementasi Teknologi Blockchain di Perpustakaan: Peluang, Tantangan, dan Hambatan." *Buletin Perpustakaan Universitas Islam Indonesia* 4 (2): 173–200.

Wang, Dan. 2022. "Bibliometric Analyses and Network Mapping on the Smart Library in Web of Science from 2003 to 2021". https://doi.org/10.1108/LHT-08-2022-0361.

Woodall, Angela, and Sharon Ringel. 2020. "Blockchain Archival Discourse: Trust and the Imaginaries of Digital Preservation." *New Media and Society* 22 (12): 2200–2217. https://doi.org/10.1177/1461444819888756.